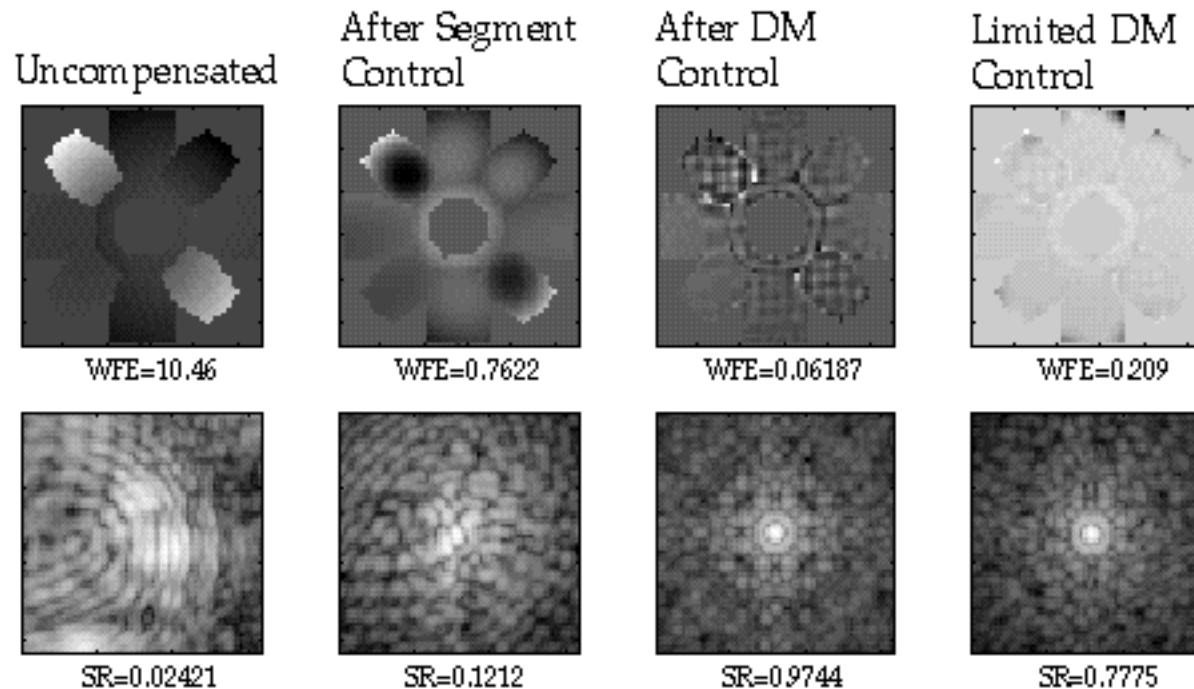




## Radius Error Example

NGST

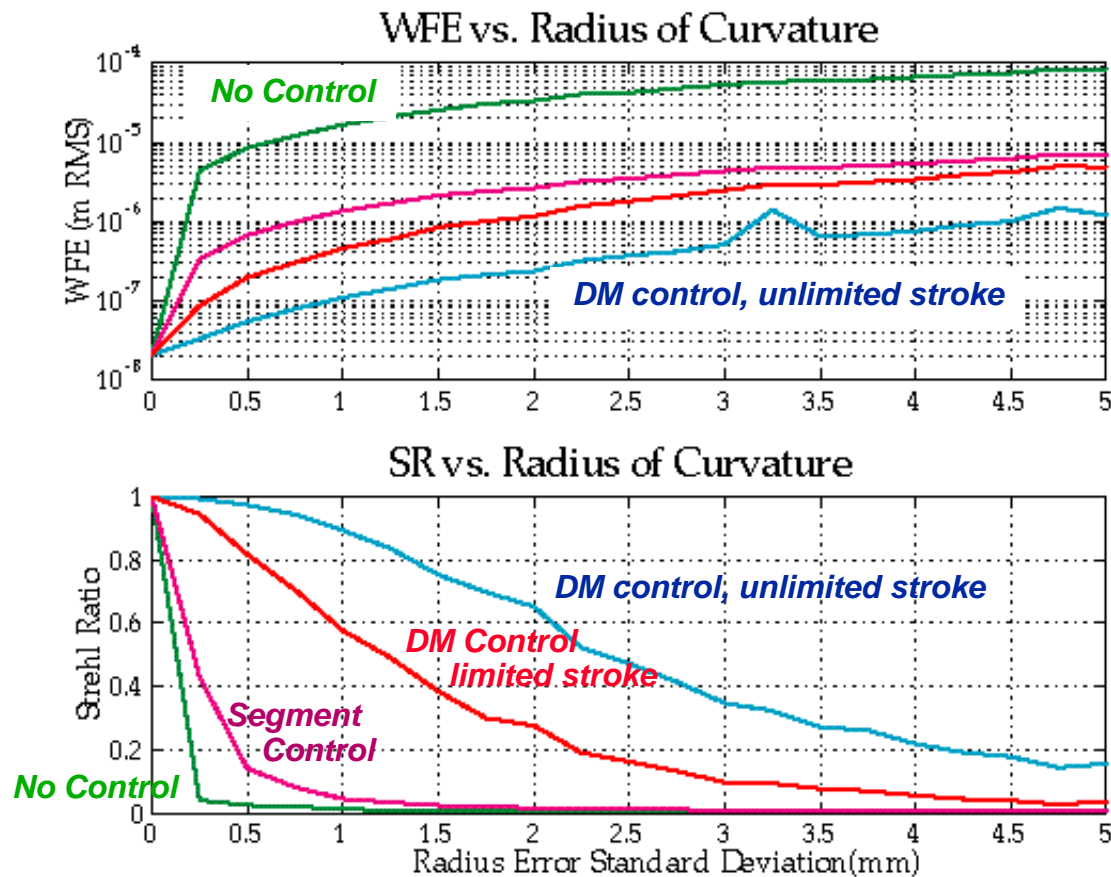


- | Randomly generated case varying segment RoC only
  - | Radii = [378, 200, -671, 188, 563, 364, -1189, -137, -161]  $\mu\text{m}$
  - | Mean = -52  $\mu\text{m}$
  - | Standard deviation = 565  $\mu\text{m}$
- | Segment control reduces WFE and smooths edges
- | DM improves SR to .97 – except required stroke is greater than  $\pm 2.5 \mu\text{m}$
- | Limiting DM stroke reduces SR to .78



# Radius Tolerances

# NGST



## Monte Carlo Simulation

Each segment radius varied

independently

100 trials per point

Wavelength = 2  $\mu$ m

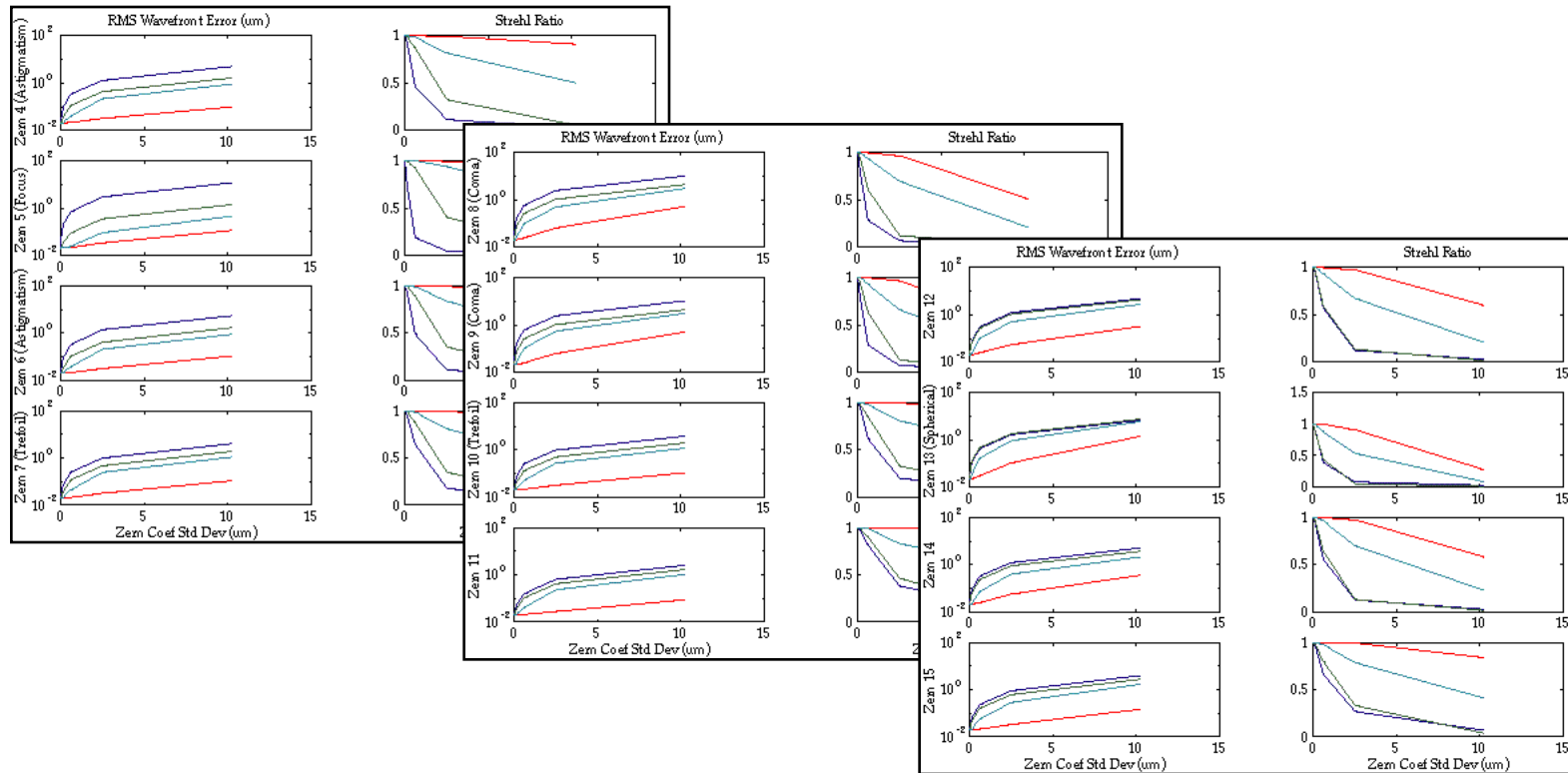
DM stroke limit =  $\pm 2.5$   $\mu$ m

- | Segment control only errors reach diffraction limit at 0.1 mm radius error standard deviation
- | Stroke-limited DM reaches diffraction limit at 0.5 mm radius error standard deviation



## Other Low-Order Figure Errors

NGST



**Monte Carlo analysis conducted for each of the third-order Zernike polynomials**

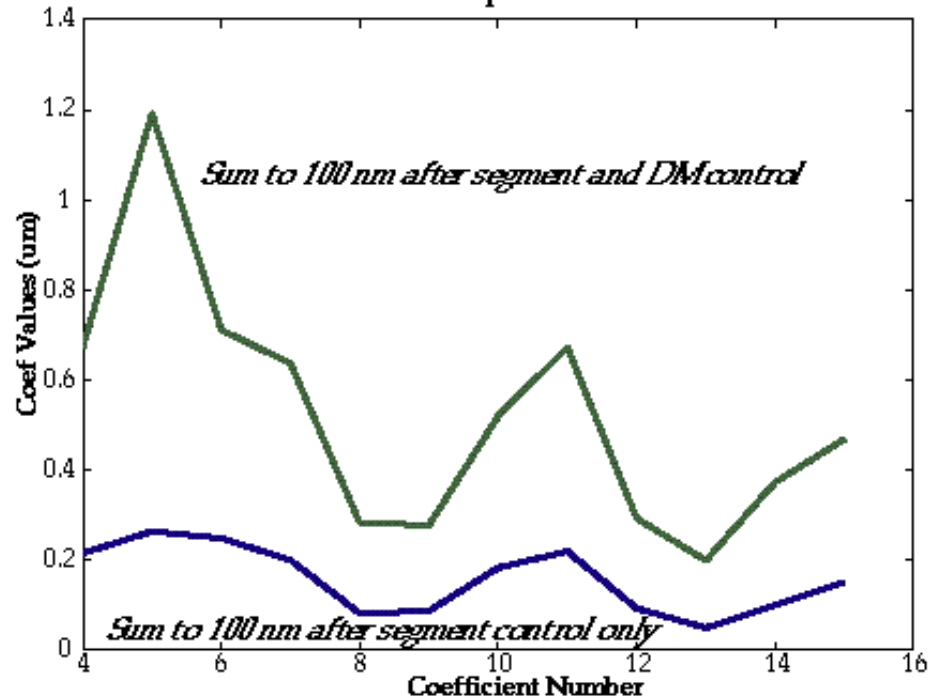
- Includes astigmatism, coma, trefoil, focus/radius and spherical aberration effects
- Zernikes normalized on the NGST pupil
- Zernikes varied independently on each segment
- 100 runs per point, 12,000 total



## Low-Order Figure Errors (cont.)

# NGST

Zernike Coefficients Proportioned to 100 nm WFE



### Low-Order Figure Error Budget

Total  
100 nm

Term	Allowed Dev	Post-control
Z4	673 nm	43 nm
Z5	1191 nm	43 nm
Z6	711 nm	43 nm
Z7	637 nm	43 nm
Z8	283 nm	43 nm
Z9	278 nm	43 nm
Z10	520 nm	43 nm
Z11	673 nm	43 nm
Z12	292 nm	43 nm
Z13	199 nm	43 nm
Z14	373 nm	43 nm
Z15	469 nm	43 nm

- | Monte Carlo results processed to find value for each Zernike coefficient that contributes 43 nm to WFE
  - Cumulative effect sums to 100 nm WFE
- | Establishes strawman error budget
  - Post segment control
  - Post DM control